In this work we are concerned with the problem of testing the equality of the means from the two populations for the case where the population covariance matrices are unequal. Well-known problem frequently occurring in applied statistics, called the Behrens-Fisher problem. This is widely used in economy, social sciences and medicine. We concentrate mainly on multivariate case. We study variety of possible approaches, bayesian, parametric, nonparametric, with particular solutions. At the close we mention one of possible solutions of generalized multivariate Behrens-Fisher problem, Mack-Wolfe test. A Monte Carlo simulation was conducted in order to illustrate their properties for different dimensions, the degree of heteroscedasticity, sample sizes and correlation coefficients. For comparison we mention classical two sample multivariate Hotelling T2. We demonstrate impact of nonnormality by estimating the type I error and power for selected solutions. Finally we use real data form Forest inventory in the Czech Republic 2001-2004 and we present the necessity of solution of this problem in practice.